REMARKS

Claims 11-12, 15-23, and 26-29 are pending.

Claims 1-10, 13-14, and 24-25 have been cancelled.

Claims 30-35 have been added.

In the Office Action dated April 3, 2009, claims 11-15, 20-26 and 21-29 were rejected under 35 U.S.C. § 101; claims 21-29 were rejected under 35 U.S.C. § 112, ¶ 1; claims 11-12, 15-16 and 20-23 and 26 were rejected under 35 U.S.C. § 102(b) or 35 U.S.C. § 103(a) as obvious over "In Proceedings of the Thirteen Annual Conference on Uncertainty in Artificial Intelligence (UAI-97), pages 3-13 (Bauer); claims 17-19 and 27-29 were rejected under 35 U.S.C. § 103(a) as unpatentable over Bauer in view of U.S. Patent Publication No. 20030018494 (Bronstein); claims 11-16, 18-26 and 28-29 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,807,537 (Thiesson) in view of U.S. Patent No. 6,269,351 (Black); claims 17 and 27 were rejected under 35 U.S.C. § 103(a) as unpatentable over Thiesson in view of Black and further in view of Bronstein.

REJECTION UNDER 35 U.S.C. § 101

Independent claim 21 was rejected under § 101 as purportedly being directed to software per se. To address this rejection, the preamble "hardware system" has been replaced with "system" and "environment" in the body of claim 21 has been replaced with "environment having at least hardware elements." Support for the amendment can be found at least on page 5, lines 25-28, of the specification, and the accompanying Fig. 1. By specifying an environment having at least hardware elements to generate a set of present observation data in claim 21, it is respectfully submitted that claim 21 does not constitute software per se, as alleged by the Office Action.

Therefore, withdrawal of the § 101 rejection of claim 21 is respectfully requested.

Independent claim 11 was rejected under § 101 as being directed to non-statutory subject matter. Claim 1 has been amended to recite that the environment has at least hardware elements. The tasks recited in claim 1 are performed with respect to such environment that has at least hardware elements. Such environment having at least

hardware elements are specifically recited in each of the "generating," "obtaining," "using" elements of claim 11. Moreover, claim 11 is directed to adapting a Bayesian network that models the environment having at least the hardware elements, where the method includes adapting a learning rate for the parameters of such Bayesian network.

Thus, it is clear that each of the elements of claim 11 are directed to applying transformation of representations of an environment that has at least hardware elements. This satisfies the machine-or-transformation test of *In Re Bilski*. According to *In Re Bilski*, the transformation applied does not have to be transformation of a physical object. Rather, the transformation can be of a signal that is representative of a physical object. *See In re Bilski*, 545 F.3d 943, 964 (Fed. Cir. 2008) (en banc), *cert. granted*, 2009 U.S. LEXIS 4103 (2009).

In view of the foregoing, it is respectfully submitted that claim 11 and its dependent claims recite statutory subject matter.

Withdrawal of the § 101 rejection of claim 11 is therefore respectfully requested.

REJECTION UNDER 35 U.S.C. § 112, ¶ 1

Independent claim 21 was rejected under § 112, ¶ 1, based on recitation of "hardware system" in the preamble of claim 21. To address this rejection, the preamble language "hardware system" has been replaced with "system." Moreover, claim 21 has been amended to recite that the system comprises an environment having at least hardware elements to generate a set of present observation data, which is supported by the specification on page 5, at lines 25-28.

In view of the foregoing, it is respectfully submitted that the § 112, ¶ 1, rejection of claim 21 has been rendered moot.

REJECTION UNDER 35 U.S.C. §§ 102 OR 103

Independent claim 11 was rejected as either being anticipated, or in the alternative, as being obvious in view of Bauer. Bauer clearly does not disclose at least the following element of claim 11:

> adapting a learning rate for the parameters such that the learning rate
> responds to changes in the environment indicated in the present

observation data by **increasing** the learning rate when an **error between the estimate and a mean value** of the parameters is relatively large and **decreasing** the learning rate when convergences is reached between the **estimate and the mean value** of the parameters;

Paragraph 64 on page 10 of Bauer (as identified by the Examiner in an annotated version of Bauer) states that the learning rate η can be adapted over time, "based on the number of examples seen so far ...." However, even though Bauer mentions the adaptation of the learning rate, η, there is absolutely nothing in Bauer to even remotely hint at increasing the learning rate when an error between the estimate and a **mean** of the parameters is relatively large, and decreasing the learning rate when convergences is reached between the estimate and the **mean** of the parameters.

It is noted that Bauer discloses that its learning rate is adapted over time "based on the number of examples seen so far . . ." Bauer, page 10, ¶ 64. Adapting a learning rate based on the number of examples seen so far is completely different from the subject matter of claim 11, where the learning rate is increased when an error between the estimate and a mean of the parameters is relatively large and decreasing the learning rate when convergence is reached between the estimate and the mean of the parameters.

With respect to the "adapting" element of claim 11, the Examiner also cited ¶¶ 10-13 on page 2 of Bauer. Paragraph 10 of Bauer notes that Bauer's update rule results in a family of updater rules with varying learning rates. Paragraph 11 of Bauer discusses various possible values of the learning rate. Paragraph 12 of Bauer notes that the optimal value of the learning rate cannot be computed. However, ¶ 12 of Bauer does note that experiments indicate that a learning rate of 1.8 works better than a learning rate of 1. Paragraph 13 of Bauer refers to on-line learning. None of these passages provide any hint of the specific learning rate adapting that is performed in claim 11.

The Office Action also cited ¶¶ 29-30 on page 4 of Bauer. A review of these two paragraphs also indicate that these paragraphs provide absolutely no hint of the specific learning rate adapting that is performed in claim 11.

That is also true of the remaining passages of Bauer cited by the Office Action against the "adapting a learning rate" element of claim 11.

The Office Action also pointed to the convergence property section on pages 5 and 10 of Bauer. Page 5 of Bauer refers to convergence properties, but does not provide any indication of the specific learning rate adapting performed in claim 11. That is also true of the discussion on page 10 of Bauer, which also does not provide any teaching or hint of the learning rate adapting performed in claim 11.

In view of the foregoing, it is clear that Bauer fails to anticipate the subject matter of claim 11.

In fact, the Office Action conceded as much, by asserting an alternative § 103 rejection against claim 11 over Bauer alone. As conceded by the Office Action, even if Bauer does not disclose increasing the learning rate and decreasing the learning rate in the manner recited in claim 11, the Office Action nevertheless stated that "this feature would clearly have been obvious to one of ordinary skill in the art at the time of the invention." 4/3/2009 Office Action at 8. That assertion is clearly incorrect, and is not based on any objective evidence of record. Bauer specifically notes that the learning rate is changed based on the number of examples seen. Bauer, page 10, ¶ 64. Bauer provides absolutely no hint of increasing the learning rate and decreasing the learning rate in the manner recited in claim 11. The allegation of obviousness is based entirely on a conclusory statement made by the Office Action, where the objective evidence clearly indicates that a person of ordinary skill in the art did not recognize a learning rate adapting technique as recited in claim 11.

In view of the foregoing, it is respectfully submitted that the assertion that claim 11 is obvious over Bauer is clearly incorrect.

Independent claim 21 is similarly allowable over Bauer.

REJECTION UNDER 35 U.S.C. § 103 OVER THIESSON AND BLACK

It is respectfully submitted that the obviousness rejection of claim 11 over Thiesson and Black is also erroneous.

To make a determination under 35 U.S.C. § 103, several basic factual inquiries must be performed, including determining the scope and content of the prior art, and ascertaining the differences between the prior art and the claims at issue. *Graham v. John*

Deere Co., 383 U.S. 1, 17, 148 U.S.P.Q. 459 (1965). Moreover, as held by the U.S. Supreme Court, it is important to identify a reason that would have prompted a person of ordinary skill in the art to combine reference teachings in the manner that the claimed invention does. *KSR International Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741, 82 U.S.P.Q.2d 1385 (2007).

The Office Action conceded that Thiesson fails to disclose the "adapting a learning rate" element of claim 11. 4/3/2009 Office Action at 12. However, the Office Action argued that Black discloses this feature of claim 11. *Id.* Although Black refers to an adaptive learning rate of an artificial neural network, it is respectfully submitted that the adaptive learning rate of Black is based on an error ratio that is equal to the ratio of the output pattern error of a current processing iteration to the output pattern error of the immediately preceding processing iteration. Black, 5:6-13. This is clearly not the same as the subject matter of claim 11, where the learning rate is increased when an error between the estimate and a mean of the parameters is relatively large and the learning rate is decreased when convergence is reached between the estimate and the mean of the parameters.

In view of the foregoing, it is clear that the hypothetical combination of Thiesson and Black would not have led to the claimed subject matter.

Moreover, a person of ordinary skill in the art would not have been prompted to modify the teachings of Thiesson and Black to achieve the claimed subject matter. Note also that although Thiesson refers to producing an improved Bayesian network by using a training technique as described in Thiesson, Thiesson makes absolutely no mention whatsoever of adapting the learning rate for parameters of the Bayesian network such that the learning rate responds to changes in the environment indicated in the present observation data. The secondary reference, Black, relates to adapting a learning rate of an artificial neural network. However, Black does not provide any hint that its adaptive learning rate technique can be applied to train a Bayesian network as described in Thiesson. When a person of ordinary skill in the art looks at the objective teachings of Thiesson and Black, this person would have been led to performing an update of a Bayesian network as taught by Thiesson, **without** adapting the learning rate associated

with updating the Bayesian network. This person of ordinary skill in the art would not have been prompted to apply the adaptive learning rate technique of Black, which is directed to learning an artificial neural network, to the techniques of Thiesson relating to a Bayesian network.

Claim 11 is therefore non-obvious over Thiesson and Black.

Independent claim 21 is similarly allowable over Thiesson and Black.

CONCLUSION

Dependent claims are allowable for at least the same reasons as corresponding independent claims. Moreover, in view of the allowability of base claims, the obviousness rejections of dependent claims have been overcome.

In view of the foregoing, allowance of all claims is respectfully requested.

The Commissioner is authorized to charge any additional fees and/or credit any overpayment to Deposit Account No. 08-2025 (10006656-1).

Respectfully submitted,

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